

ABSTRACT

The paper focuses on the comparison between the NOAA/NASA AVHRR Oceans Pathfinder sea surface temperature (SST) data set and SST as derived from the Along-Track Scanning Radiometer (ATSR) on board the European Remote Sensing Satellite (ERS1) (ASST). These two data sets provide a unique opportunity for comparing, on global scales, two independent satellite derived SST retrievals. The comparison was done for data between 1992 and June of 1996. In a preliminary step, mean values and standard deviations of the residuals as defined by the differences between the (Modified Pathfinder SST algorithm) MPFSST and the co-located in-situ Pathfinder matchup database were calculated. Globally, as defined by the mean difference, the MPFSST was colder than the in-situ data by -0.01°C with a standard deviation of 0.54°C . However these results were found to vary between ocean basins. The Caribbean showed the largest difference with a warm mean difference of 0.24°C and a standard deviation of 0.56°C .

Mean differences and standard deviations of the residuals as defined by MPFSST - ASST were calculated. The loss of the 3.7 micron channel on board the ATSR-1 instrument had a larger effect on the nighttime differences and thus application of the model to remove residual cloud cover only had a significant impact on the nighttime statistics. A mean difference of 1.40°C , with MPFSST warmer than ASST, and a standard deviation of 0.57 were calculated after the application of the cloud removal model to the ASST. To confirm that part of the differences between the MPFSST and the ASST was due to residual cloud cover, a set of EOFs were extracted from the MPFSST-ASST difference maps, before and after applying the cloud removal model to the ASST. A significant drop from 36% to 14% in the percent variance explained by the first mode indicates that applying the cloud removal algorithm has removed a significant signal from the difference maps. The mean bias for the summation of the first two EOFs is reduced from 0.59°C to 0.34°C and the standard deviation from 0.19°C to 0.16°C . Thus, a minimum 0.25°C of the signal in the difference maps is due to residual cloud cover in the ASST data. It is concluded that with improved cloud detection and atmospheric corrections being applied to the ASST, along with improvements to the MPFSST, achieving a 0°C mean difference and a standard deviation of $< 0.3^{\circ}\text{C}$ for global climate studies is possible.